

Historic Iron Bridges of Denton County, Texas

Dedication

The saving and restoration of historic iron bridges can be a challenge in any county, but thankfully in Denton County we had the vision and leadership of Denton County Judge Mary Horn to oversee the reuse of these treasures. Metal truss bridges are increasingly old and rare in Texas. Judge Horn saw that many of these iconic were “adopted” by various cities and school districts throughout the county for use in parks, hike-and-bike trails or bypassed along the side of the road.

This manual for teachers to teach this important era in Denton County’s history is dedicated to Denton County Judge Mary Horn for her leadership, wisdom and unyielding support of the heritage of Denton County and its residents.

Peggy Riddle
Director, Denton County Office of History and Culture
December 2018

The Denton County Office of History & Culture

The mission of the Denton County Office of History and Culture is to interpret our past to give context to our present and provide a greater direction to our future. We are committed to the development and experience of Denton County history and dedicated to the cultural enrichment of our community. Our purpose is to welcome, inform and inspire.

Introduction

The Denton County Office of History and Culture has created this guidebook with the goal of fostering public interest in historic bridges located within the county. From the information in this book, students will learn about the county's project to relocate and repurpose iron and steel bridges—some erected more than 130 years ago—saving the antique structures from demolition and enhancing the beauty and character of their new locations in Denton County. By educating elementary school students about the way that each bridge influenced the development of the county, we hope to encourage the next generation to become engaged citizens who will work to preserve these important elements of our history. The information and lessons in this book have been prepared with particular emphasis on the state standards for fourth-grade students identified below:

TEKS: History: 4c, 5a
Geography: 8a, 8b, 8c, 9a, 9b
Economics: 10b, 12a, 12b, 12c, 12e
Science, technology, and society: 20b
Social studies skills: 21e, 23a

This manual includes a brief history of bridge development in Denton County; a basic outline of the science of bridge structures to help familiarize students with terminology and designs; a timeline representing construction dates of historic bridges with significant events that influenced their construction; a map displaying their original and current locations; and a summary of the adoption and relocation process.

In addition to a selection of classroom activity ideas and handouts, we have provided detailed information and suggestions on four of Denton County's historic bridges so teachers can plan and conduct self-guided tours. These individual sketches will also help students recognize the unique nature of every bridge—each designed according to its own set of obstacles to overcome—cultivating an appreciation for the social, economic, and cultural value of Denton County's historic bridges.

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The Science and Design of Bridges

Below are models of three main types of bridges: beam, arch, and truss.

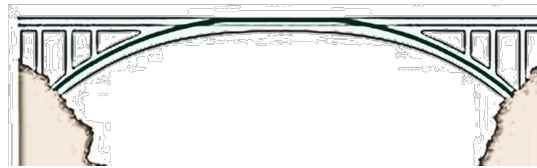
Beam

- Oldest and simplest type, a log placed over a creek is a type of beam bridge
- Inexpensive, few materials needed
- Can have other supports, called piers, between the two ends
- Used to span short distances



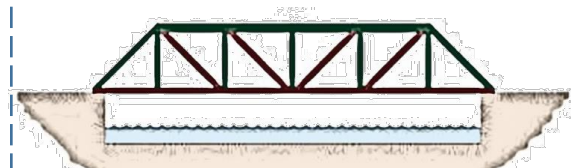
Arch

- Built in ancient times of stone or brick.
- Can be built with more arches for extra distance
- Able to span long distances, but this requires large abutments, reducing space underneath for car or boat traffic.

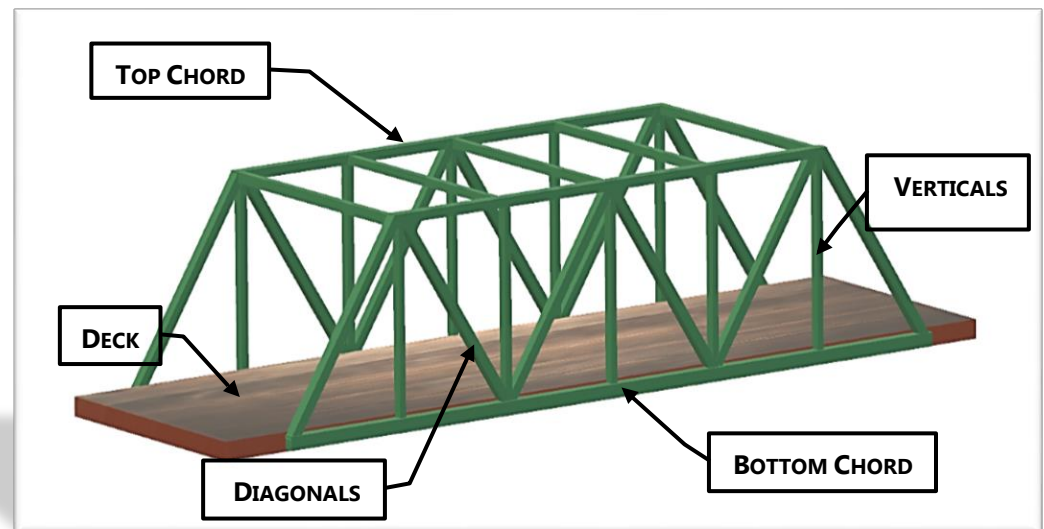


Truss

- A beam bridge reinforced with a triangular framework of metal bars
- Stronger because the trusses help distribute some of the weight.
- More lightweight than a beam bridge
- Used to span medium distances



The historic bridges in Denton County are all iron truss bridges. Each one has a unique appearance based on its location, purpose, size, and builder; yet, they all share certain features that make them truss bridges



History of Bridges in Denton County

In 1836, after Texas gained independence from Mexico, settlers began migrating to the new republic by the thousands. The vast and inexpensive land brought migrants who journeyed from across the United States and even as far as Europe with hopes that, in Texas, they could make better lives for their families.

Many chose to settle in Denton County for its **fertile** soil and plentiful water that flowed in the many creeks and rivers. Wooden bridges, built by Native Americans and Texas Rangers protecting the area, **spanned** some of these creeks, but soon became too fragile for the pioneers with their heavy horses and wagons. They needed sturdy, safe bridges to carry them to their new homes and to the towns where they could trade for items they would need to survive.

Metal truss bridges soon replaced the wooden bridges, connecting residents of distant communities who cherished being able to stay in touch. Now they could more easily travel for friendly visits or send letters on the new postal routes.

In the late 1870s, bridge construction in the county rose to match the jump in **population** from 7,000 to over 18,000. Driven to succeed, those who endured the challenges of **subsistence farming** progressed to farming **cash crops** like wheat and cotton. However, they needed to sell their crops outside of Denton County, meaning there must have good transportation routes to the newly built railway lines that linked Texas to the rest of the country.

Therefore, in 1882, Denton County granted \$10,000 to build new bridges. By 1910, the county

had around thirty iron bridges—quite an upgrade from the few rickety wood bridges of the past.

Over the next **century**, the bridges that symbolized the early **economic** success of Denton County started to age and the Department of Transportation tore down and replaced many worn down or weak older bridges.

Luckily, Denton County saw the historical importance of the bridges and knew they must protect them from destruction. By putting the bridges up for adoption, they provided an opportunity for new owners to relocate and repurpose them as **pedestrian** walkways at parks, schools, or city halls. Now, thanks to the adoption program, these bridges can continue their purpose of connecting the citizens of Denton County to each other, and to the past.

Vocabulary:

fertile- able to support the growth of many plants

span-the distance covered from one end of a bridge to the other

population- the number of people who live in a place

subsistence farming- all of the crops planted are used by the family, leaving little, if any, for sale or trade.

cash crops- a crop (such as wheat or cotton) that is grown to be sold rather than used by the farmer.

century- a period of 100 years

economic- relating to the system of goods and services that are made, sold, and bought

pedestrian- a person who is traveling by foot



Discussion Questions:

What do you think the earliest bridges in Texas looked like? What were some of their disadvantages?

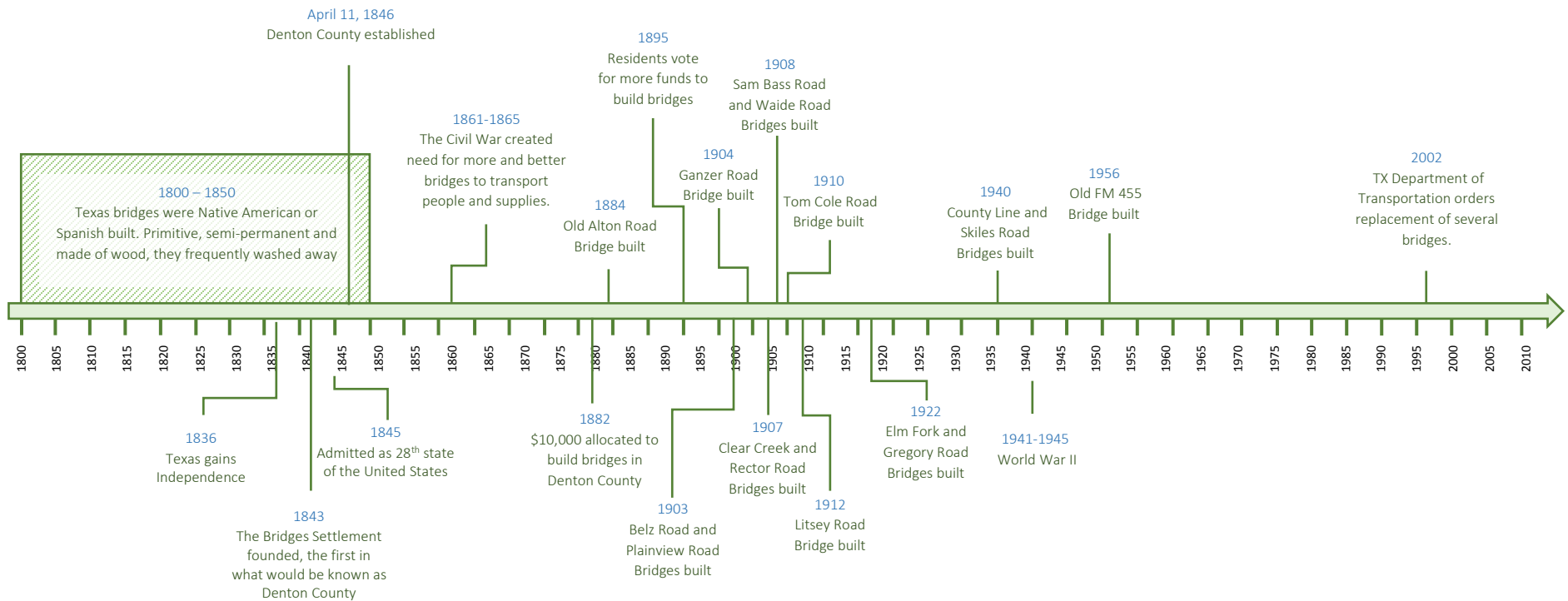
What are some of the ways bridges helped the first settlers in Denton County?

How do the historic bridges help Denton County residents today?

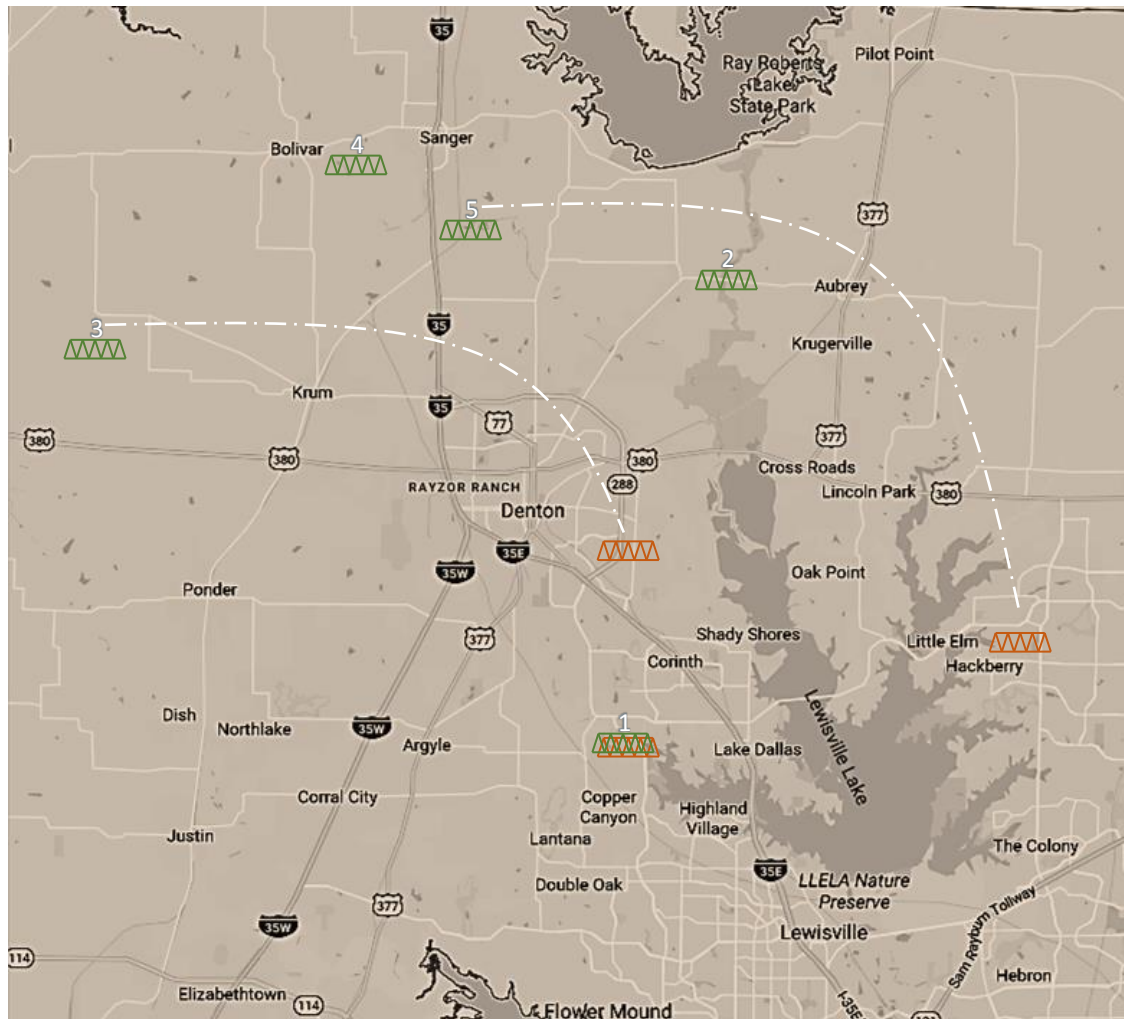
Handouts:

- How Bridges Work Handout
- Basic Types of Bridges Handout
- Bridge Vocabulary Practice work sheet
- Bridge City work sheet

Timeline of Historic Bridges in Denton County



Map of Historic Bridges in Denton County



▲▲▲▲ - Original Location

▲▲▲▲ - New Location

1. Old Alton Bridge
2. Elm Fork at Trinity River
3. Donald Road Bridge at Hickory Creek
4. Sam Bass Road Bridge at Clear Creek
5. Ganzer Road Bridge at Milam Creek

Old Alton Bridge



Built in 1884, this truss bridge spans Hickory Creek. It gets its name from the town of Alton that served as the government center for Denton County in 1849. The growing county soon needed a more central location for its courthouse so, in 1856, they chose to move it to its present spot in Denton. After the move, one-by-one Alton businesses closed their doors to relocate to the new **county seat**, causing the residents of Alton to follow soon after. Today, little remains of Alton besides an old church and a cemetery with graves dating back to 1852.

Hoping to **revive** the town, the county built a bridge in Alton on the creek once used as a **ford** by cattle on the Chisolm trail. Although it failed to bring life back to Alton, the bridge carried plenty of traffic over the next 100 years, eventually shifting from travelers in wagons to drivers in cars.

Built with fewer, lighter, and slower travelers in mind, the bridge became a safety concern with the switch to automobile traffic. Not as wide as modern bridges, drivers often honked their horns when crossing to keep cars from entering on the other side until they passed through. So, in 2001, the county ordered a concrete replacement wide enough to hold two lanes of traffic.

Instead of destroying the old bridge, the county decided to **restore** and repurpose it for use in horse and hiking trails. Once again, the rhythmic pounding of hooves can be heard crossing the wooden **deck**. After so many years, the surrounding woods have grown into the bridge. Vines wind in and out of the trusses, lofty trees cast it in shadow, the aging metal bars groan and creak with each breeze. It is easy to see why this spot has inspired ghost stories and continues to attract visitors who want to experience its enchanting yet spooky setting.



Vocabulary:

county seat- the town or city in a county where the government offices and buildings are located

revive- to make someone or something strong, healthy, or active again

ford- a shallow part of a river or stream that may be crossed by walking.

restore- to return something to an earlier or original condition by repairing it

deck- the surface of a bridge that people or things drive and walk across



Discussion:

Why do you think building the Old Alton Bridge did not help bring back the town of Alton?

Have you ever visited a “ghost town”? What do you think the phrase “ghost town” means?

What groups or types of people might like to visit this bridge now? What would they do there?

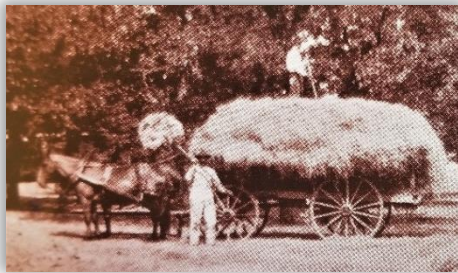
Activity:

- Bridge Maze work sheet
- Photograph Investigation
- Journal Entry

➤ While not a safe for a class trip, it is a great location to encourage for family hikes or visits.

Donald Road Bridge

Constructed in 1903, Donald Road Bridge spanned South Hickory Creek near the town of Krum. Its truss design became very popular and soon the county erected many like it to help connect the **isolated** farming communities to each other.



The new, durable bridge had a valuable use for Denton County farmers who could now more easily transport wheat and cotton from their farms over Hickory Creek, and into Krum by horse and wagon. Krum possessed both a **mill** to grind wheat into flour and a **gin** that separated seeds from cotton fiber. After milling or ginning their crops, the farmers could then load the agricultural products aboard the railroad cars that also resided in Krum to sell them all over the country.

With Donald Road Bridge carrying the produce of farms to mills, gins, and railways of Krum, the county became the center of the “Wheat Belt,” ranking first and second in Texas wheat production from 1890 to 1920. Each year, hundreds of train cars full of wheat and cotton departed Krum to be sold around the country, bringing hard-earned money to the farmers of Denton County.

After over 100 years of service to the county, Donald Road Bridge found a new purpose. Not built to carry the heavy burden of car traffic, the bridge no longer met safety standards and, as a result, faced **demolition**. Fortunately, in 2006 the Denton County Administrative Complex adopted the bridge, relocating it to its present location where it is now a pedestrian bridge along with Gregory Road Bridge (built in 1923). The two bridges span a beautifully landscaped stream, surrounded by **native** flowers that attract butterflies, birds, and people who can find plenty of quiet spots to relax and enjoy the nature and the history of this scenic location.



Vocabulary

isolated—separate from others

mill- a machine for grinding grain

gin- a machine that separates the seeds of cotton plants from the cotton

demolition—destruction of a building or other structure

native- a kind of plant or animal that originally grew or lived in a particular place



Discussion:

How has the Donald Road Bridge contributed to the agricultural success of Denton County?

What types of transportation do you think travelled the bridge when it was new? How has this changed over time?

What are the benefits of preserving or relocating historic bridges?

Handouts/Activities:

- Spot the Difference worksheet
- Journal Entry
- This location may not be ideal for a field trip in itself; however, it is a wonderful spot to have lunch after a field trip somewhere else. The two historic bridges are surrounded by beautiful native plant life with plenty of open space the children can explore safely.



Rector Road Bridge

The arrival of railroads in the 1880s transformed the **economy** of Denton County. They helped farmers and ranchers quickly reach distant buyers with their products and allowed more items to enter the county at a lower cost. With more money earned from their products and lower prices on the **merchandise** in shops, the citizens no longer needed to make everything

themselves, freeing up time to do other things like travel into the city for shopping, trading, or fun.

At the same time, the population of the county grew right along with its **prosperity**. From 7,251 people in 1870, it multiplied to 28,314 in 1900. Soon, all of these new residents had the **leisure** time and money to travel beyond their own farmland into the city of Denton to do their shopping and trading.



The trip to Denton from Sanger involved crossing Clear Creek. The townspeople, who now had more reasons for the journey, wanted to make it faster and safer with a new bridge, so they donated \$1,200 of their own money to build Rector Road Bridge in 1907. It carried the citizens from Sanger to Denton where they could shop, sell their products, or simply take a break from their farms to enjoy the energetic city **atmosphere**.



Almost one-hundred years later, in 2005, Rector Road Bridge failed to meet safety standards. Instead of letting the bridge be destroyed, the Denton Independent School District worked with the county to give it an opportunity to benefit a different community. The school district adopted the bridge, moving it fifteen miles away to John H. Guyer High School. Now, students can walk across this beautiful bridge that extends over an environmentally sensitive area of their campus, enjoying a view of history and nature as they make their way to class.

Vocabulary:

economy- the system of goods and services that are produced, bought, and sold in a region

merchandise- goods that are bought and sold

prosperity- the state of being successful usually by making money

leisure- free time used for enjoyment

atmosphere- the particular way a place or situation makes you feel

Discussion:

How did the arrivals of railroads change the economy in Denton County?

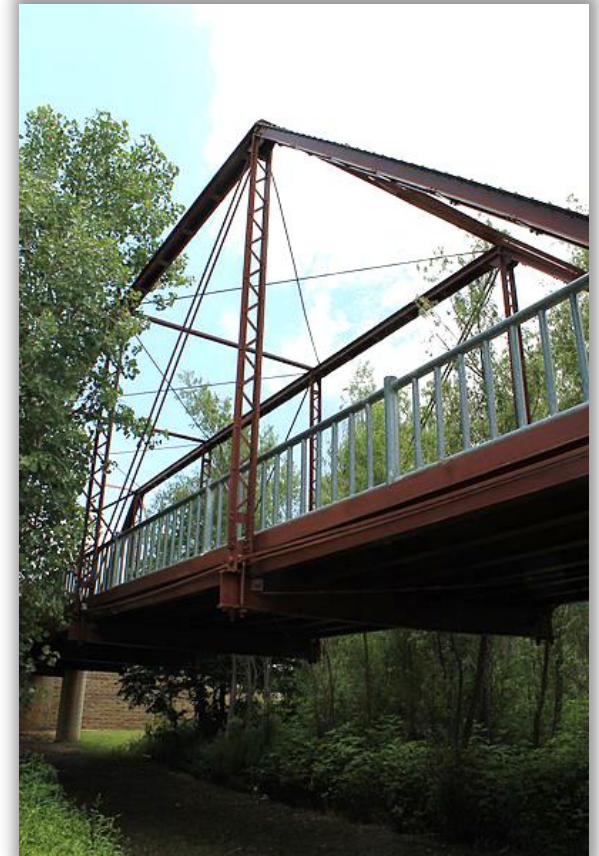
How did this influence the construction of bridges?

What impact has the Rector Road bridge had on its environment?

Can you think of another place that could use one of these bridges?

Handouts/Activities:

- Spot the Difference work sheet
- Bridge City
- Journal Entry



Elm Fork Bridge

In 1913, Henry Ford **revolutionized** transportation, changing the way Americans travel ever since. He did not invent the automobile; they had been around since the 1890s but were so expensive to build only the richest people could buy them. Instead, Ford's use of **assembly lines** in his factories made cars affordable for average people. His method made production faster by dividing the work into many simple tasks performed by individuals as the car passed down a moving line, resulting in a less expensive final product. This impacted the entire country and by the 1920s, thousands of cars traveled the roads of Denton County where a dozen years earlier, there had been less than ten.



All these cars needed better roads and bridges that could support their speed and weight. Denton County residents voted for several road projects, one being the construction of Elm Fork Bridge in 1922. The truss bridge spanned 100 feet over the Trinity River, making it the longest bridge in the county when built. In addition, the bridge was wide enough to **accommodate** two-way traffic, unlike the older one-lane bridges in the area. Located on Sherman Highway, a road that once served as a wagon trail, this new bridge became the perfect symbol for the **modernizing** effect of automobiles on the county.

By 1990, the rise in car traffic became too much for Elm Fork Bridge and the former wagon trail (now FM 428). While the road could be widened, the bridge could not. Luckily, the county designed the new road to **bypass** Elm Fork Bridge, allowing it to remain as a pedestrian bridge in what is now part of Ray Roberts Lake State Park. These days, as drivers zoom down the road in their cars, they can still see the beautiful old bridge—now painted a striking red—that helped usher in a new era of transportation for Denton County.



Vocabulary:

revolutionize- to change (something) very much or completely

assembly line- a line of machines or workers in a factory that build a product by passing work from one station to the next until the product is finished

accommodate- to have room for (someone or something)

modernize- to make (something) modern by following the newest technology, information, or methods

bypass- to go around or avoid a place or area



Discussion:

What are some ways that the rise of the automobile changed the country? Economically? Culturally? Physically?

How would your life be different if your family did not have a car?

What do you think the next revolution in transportation might be? How will it affect today's roads and bridges?

Handouts/Activities:

- Photograph Investigation
- Journal entry
- The Recycled Bridge Activity

Relocating Historic Bridges

When engineers for the Texas Department of Transportation determine that a bridge is no longer strong enough to carry vehicles, the bridge is either repaired, destroyed, **bypassed**, or moved. If the bridge is historically significant, like many of the bridges in Denton County, the process for preserving and relocating the bridge can begin!

Step One- Verify that the bridge really is historic.

The label '**historic**' does not just mean 'old.' Historians research the bridge to find **evidence** that reveals its influence on the growth of the county. If the findings prove that the bridge contributed in an important way, it is labeled as historic and approved for **preservation**.

Step Two- Put the bridge up for adoption.

If the city planners cannot design a new route that goes around the old bridge, like Old Alton Bridge, then it is time to find it a new home. Just like cats and dogs at the shelter, historic bridges become available for **adoption** in hopes that a new owner will find them. Along with a website listing all of the adoptable bridges, the county sends out letters to school districts, parks, city halls, and other public sites to see if anyone thinks the bridge would be a good fit for their location.

Step Three- Moving the Bridge

Once a bridge is adopted, the next step is to move the structure to its new home. The job of moving the bridge is given to the people who have adopted the bridge. The county's Road and Bridge crew moved the bridges adopted by Denton County. Part of their job is to make sure there are safe and **functional** ways for people to travel across the county. The crew uses heavy **machinery** to take apart the bridge for transport and then put it back together in its new location, just like a puzzle. In the new location, the crew adds new elements to make the bridge safe for its new use.



Vocabulary:

Bypass- to go around

Historic- important to history

Evidence- facts or information

Preservation- the act of caring and protecting something from harm or destruction

Adoption- the act of taking care of something new

Functional – something that works well

Machinery- the working parts of a machine

Discussion:

How you decide if something is “historic?”

Can anyone adopt a bridge? Why do you think private homes and businesses can’t adopt a bridge?

If you brought a bridge to your school, where would it go? What purpose would it serve?

Handouts/Activities:

- Spot the Difference worksheet
- The Recycled Bridge Activity

Additional Resources

Interactive maps of Denton County historic bridge original and current locations:

Map and bridge descriptions

- <http://dentoncounty.maps.arcgis.com/apps/MapTour/index.html?appid=822337f155e34183b6497bc53b53696a>

Map with blog detailing the history of bridges and the adoption/relocation process

- <https://dentoncounty.maps.arcgis.com/apps/Cascade/index.html?appid=7e7cda4f194e4a51b5959c4de261bdd4>

About the author,



Kasie Moffett is a Graduate Student at TWU working towards her master's degree in History. She completed this project as part of a 2018 summer internship under the guidance of TWU Associate Professor of History Dr. Katherine Landdeck.

Historic Iron Bridges of Denton County, Texas

Handouts and Activities

How Bridges Work

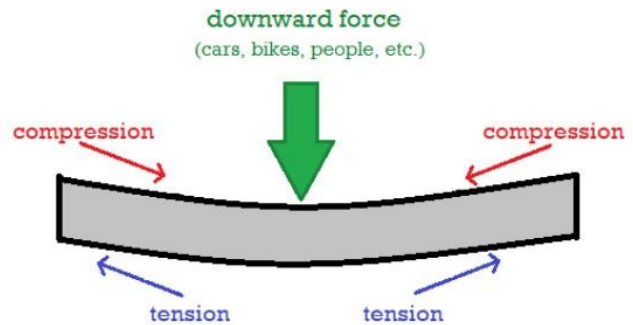
Two major forces act on a bridge: **tension** and **compression**

→ **COMPRESSION** ←

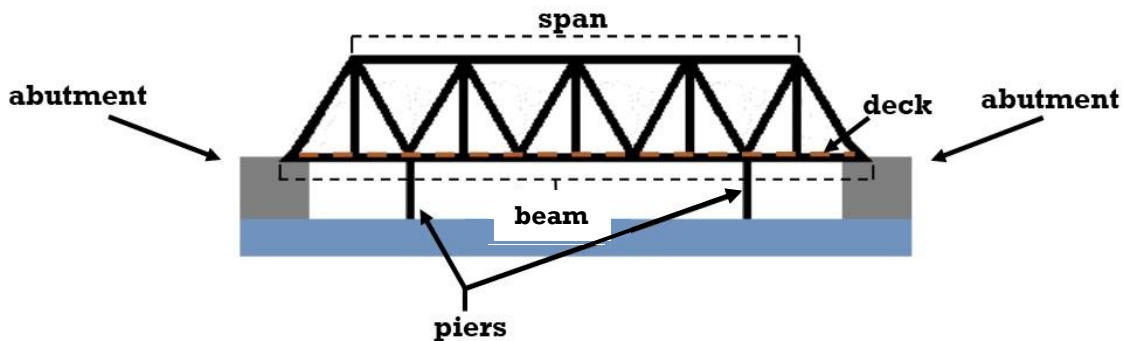
-a pushing force that squeezes a material together

← **TENSION** →

-a pulling force that stretches a material apart



Bridge Vocabulary



abutment- the support structures on each end of a bridge

beam- long, horizontal structure that stretches the length of a bridge

civil engineer- person who designs roads, bridges, and large buildings

deck- the part of a bridge you walk or drive on

load- the amount of weight that a bridge is designed to carry

pier- a vertical supporting structure

span- the distance a bridge extends between two supports

Basic Types of Bridges

Beam Bridge

- Oldest and simplest, a fallen tree over a creek could be a type of beam bridge
- Inexpensive- easier to build and needing fewer materials than other types of bridges
- Can have other supports, called piers, between the two ends
- Used to span short distances



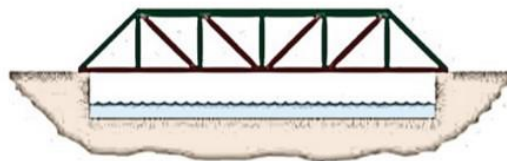
Arch Bridge

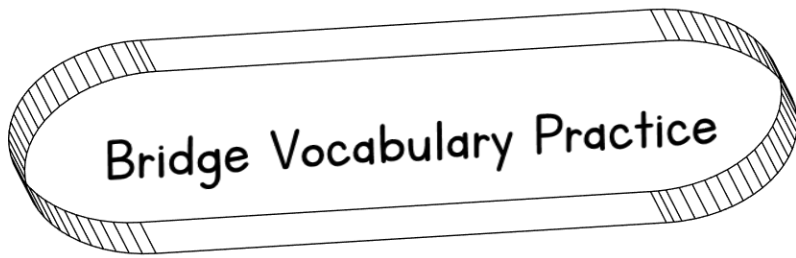
- Built in ancient times of stone or brick. Now, made of concrete and steel.
- More arches can be added to the bridge for more distance and strength.
- Able to span long distances, but longer spans require larger **abutments** for support, reducing space underneath through which cars or boats can travel.



Truss Bridge

- A beam bridge reinforced with a triangular framework of metal bars
- Stronger because the trusses help distribute some of the weight.
- Lighter than a beam bridge
- Used to span medium distances





Name _____

Directions: Use the correct term from the word bank below to complete each sentence about the design of bridges.

Abutments	Compression	Pedestrian
Arch	Deck	Span
Beam	Force	Tension
Civil Engineer	Load	Truss

1. A simple horizontal structure held up by pillars on each end is a _____ bridge.
2. The pushing force that squeezes parts of a bridge is called _____.
3. A framework made up of triangular bars makes a _____ bridge stronger than a beam bridge.
4. Horses and wagons used to travel on top of the wooden _____ of the old bridge.
5. To support the pressure on the arch, two large _____ rest at each end of the arch bridge.
6. The pulling force that stretches parts of a bridge is called _____.
7. The weight a bridge is designed to carry is called the _____.
8. Instead of vehicles, people will travel the _____ bridge on foot.
9. A _____ designs roads, bridges, or large buildings that are used by the people living in a community.
10. The _____ of the bridge must be at least 25 feet in order to reach the other side of the river.
11. The engineer considered each type of _____ that might affect the bridge such as gravity, the weight of traffic, high winds, or earthquakes.
12. The curved shape of the _____ bridge has been used for over 3000 years.

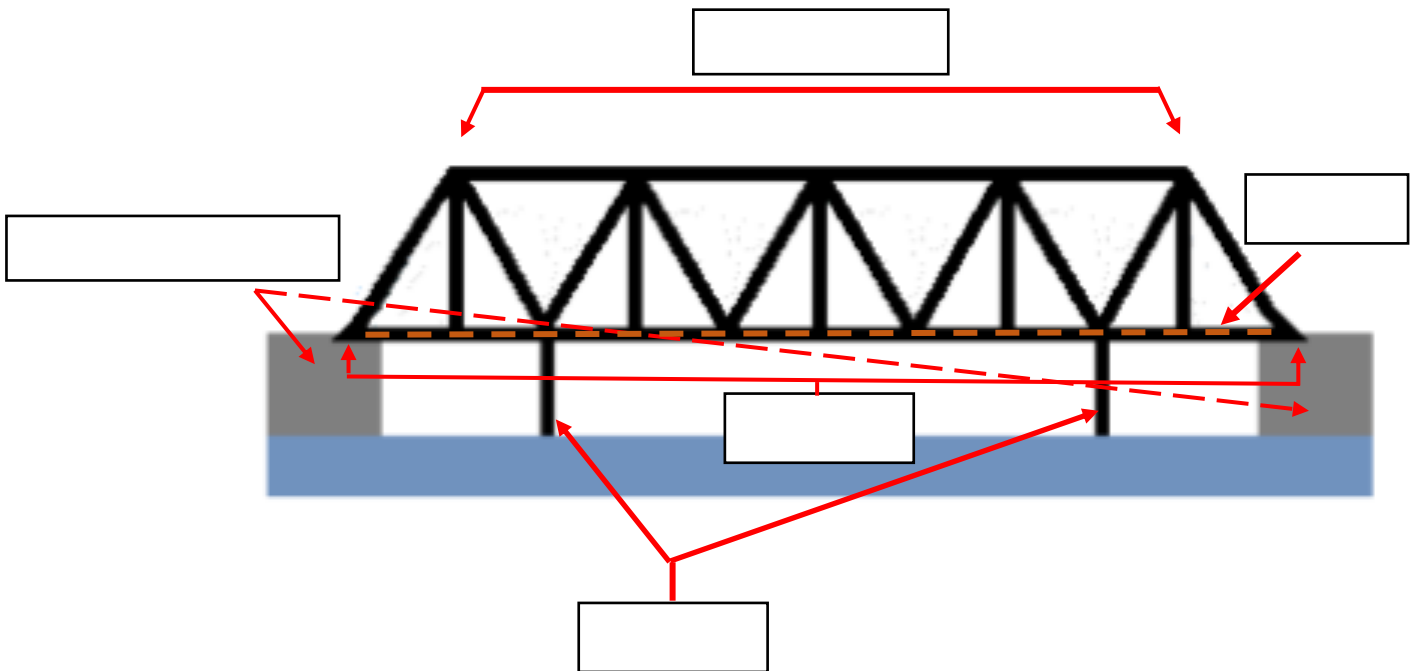
Bridge Vocabulary continued...

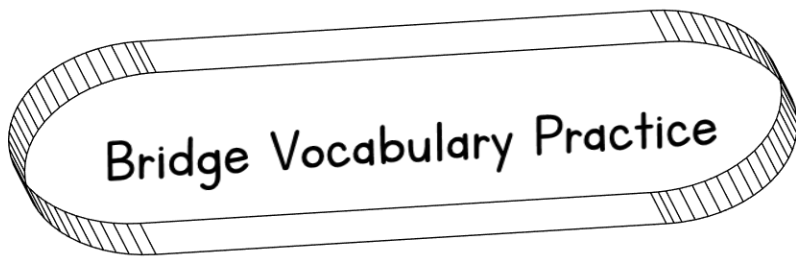
Directions: Use the correct term from the word bank to fill in the blanks.

Abutments
Span
Beam Bridge

Beam
Piers
Truss Bridge

Deck
Arch Bridge





Teacher Handout

Directions: Use the correct term from the word bank below to complete each sentence about the design of bridges.

Abutments	Compression	Pedestrian
Arch	Deck	Span
Beam	Force	Tension
Civil Engineer	Load	Truss

1. A simple horizontal structure held up by pillars on each end is a **beam** bridge.
2. The pushing force that squeezes parts of a bridge is called **compression**.
3. A framework made up of triangular bars makes a **truss** bridge stronger than a beam bridge.
4. Horses and wagons used to travel on top of the wooden **deck** of the old bridge.
5. To support the pressure on the arch, two large **abutments** rest at each end of the arch bridge.
6. The pulling force that stretches parts of a bridge is called **tension**.
7. The weight a bridge is designed to carry is called the **load**.
8. Instead of vehicles, people will travel the **pedestrian** bridge on foot.
9. The **civil engineer** designs roads, bridges, or large buildings that are used by the people living in a community.
10. The **span of** the bridge must be at least 25 feet in order to reach the other side of the river.
11. The engineer considered each type of **force that** might affect the bridge such as gravity, the weight of traffic, high winds, or earthquakes.
12. The curved shape of the **arch bridge** has been used for over 3000 years.

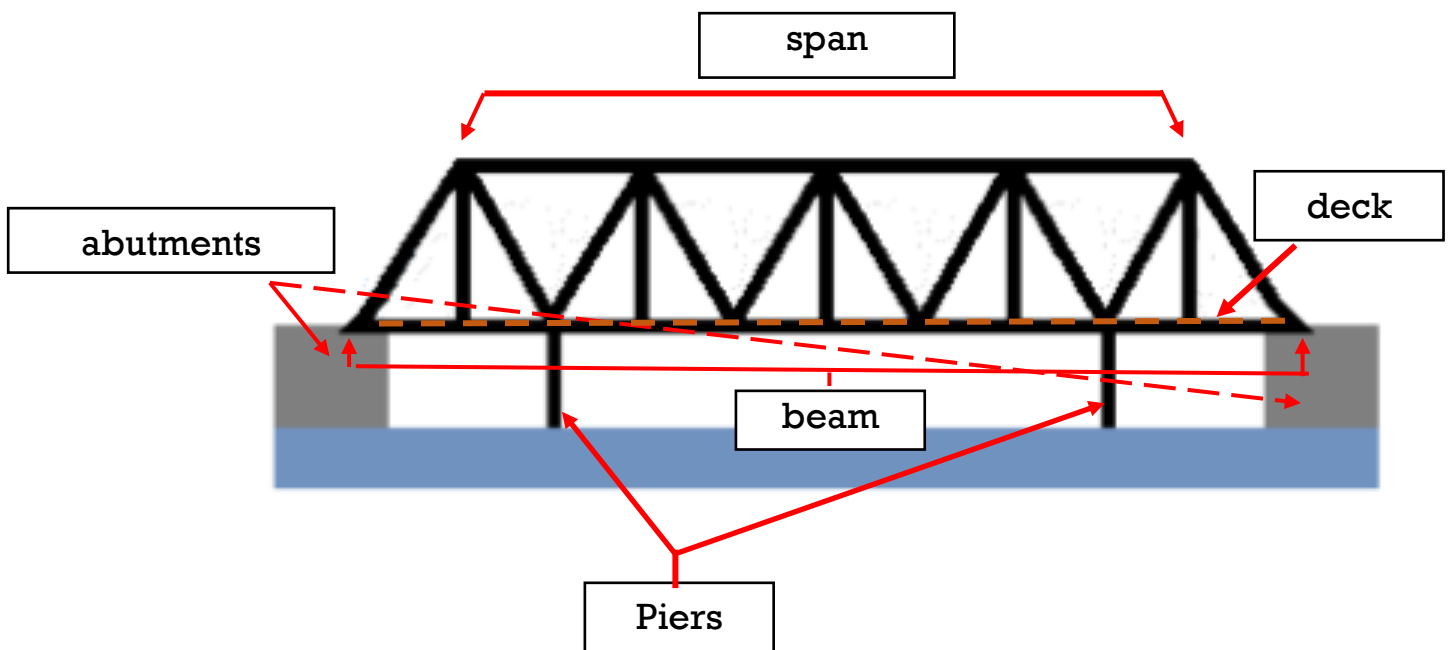
Bridge Vocabulary continued...

Directions: Use the correct term from the word bank to fill in the blanks.

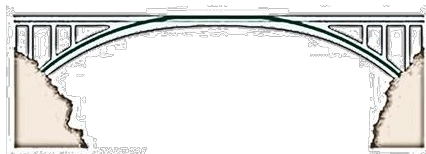
Abutments
Span
Beam Bridge

Beam
Piers
Truss Bridge

Deck
Arch Bridge



Beam Bridge



Arch Bridge



Truss Bridge

Spot the Difference

Name _____

Modification: the act or process of changing parts of something

When historic bridges move to new locations, several **modifications** occur to help them fit into their new homes.

Can you find all of the changes made to the Donald Road Bridge? Why do you think these modifications took place?



Spot the Difference

Teacher Handout

1. **Security Bollards**- used to block motor vehicles from entering the bridge.
2. **Lampposts**- makes entrance to the bridge visible at night. Illuminates change in ground surface to prevent tripping.
3. **Handrails**- creates barrier to prevent people from falling through trusses
4. **Repainted**- more attractive. Possibly needed after lead removal.
5. **Deck**- wood is more attractive and level than gravel. Safe and clean for walking.





Name _____

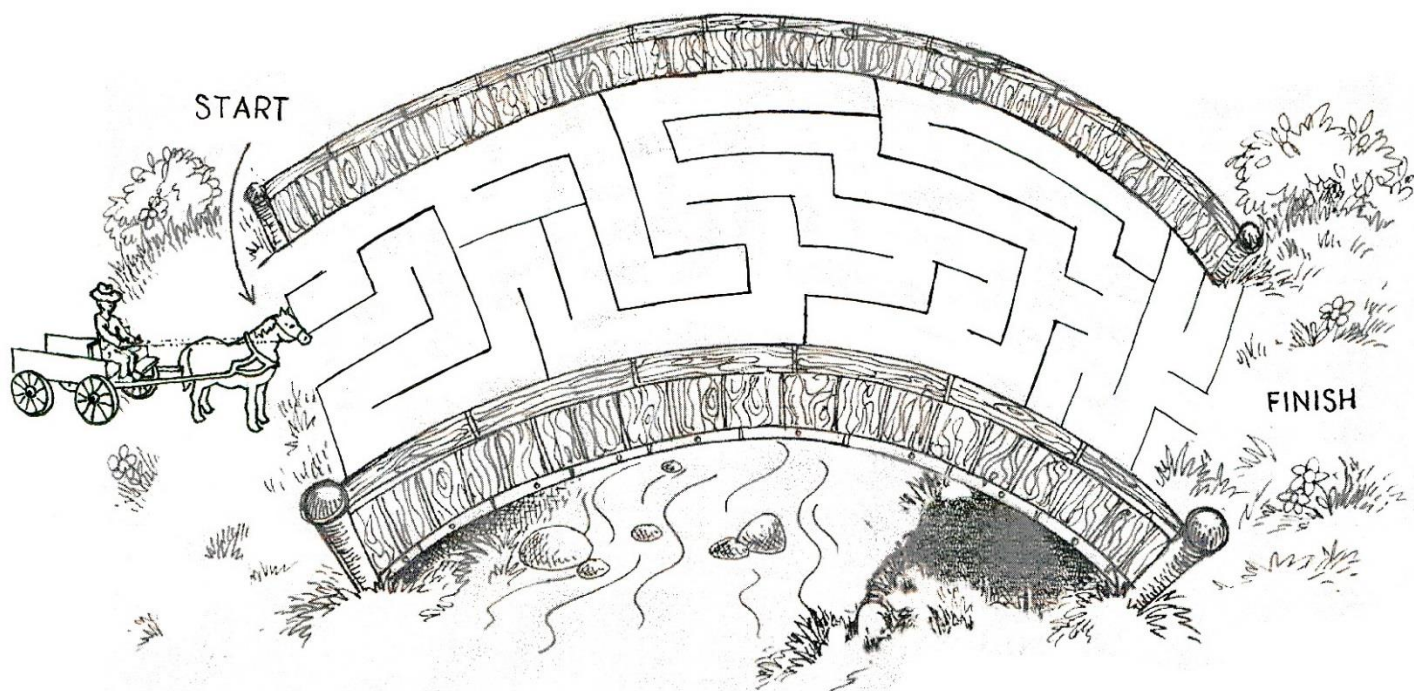
Bridge City is a new town that is ready to grow. The citizens need houses, schools, stores, and other buildings as well as a way to cross the many creeks that block their paths. Complete the picture with the buildings and bridges you think the town needs. Don't forget to draw the people and their modes of transportation!



Bridge Maze

Name _____

Farmer John is going into town to buy some flour to make biscuits. Farmer John is happy about the new bridge because it helps make his trip to town much faster, but his horse is a little nervous about crossing the water. Help guide Farmer John's horse across the bridge!



Photograph Investigation

Primary source: first-hand, original record of a historical period or event made by people at the time.

Historians often use photographs as a **primary source** when they research a historical person, place, or event. Pretend you are a historian investigating this picture of people near an old bridge at Clear Creek.



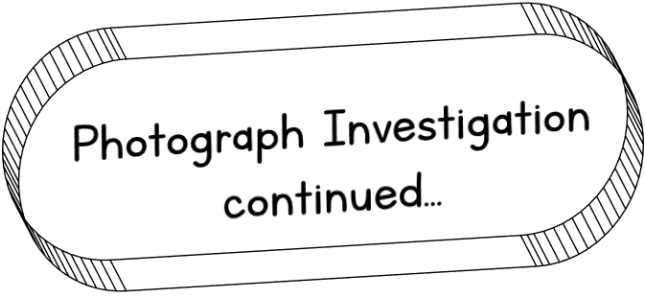
1. Make a description list of everything you see (or don't see) using the boxes below:

PEOPLE

ACTIVITIES

SURROUNDINGS

OTHER



Photograph Investigation continued...

2. What extra information can be revealed by investigating the photograph?
 - a. What do you notice about the bridge? Can you tell its type or material? How strong does it look?
 - b. When was the picture taken? What time of day? What time of year? How can you tell?
 - c. Why do you think this picture was taken? Which clues help you know more about the people in it?
 - d. Describe the environment as if you were there. What would you hear? What would you smell?
 - e. What may have happened before this scene? What might happen after? Do you think the people used or will use the bridge?
3. What questions are you left with after investigating the photograph? Is there more you wish you knew?

Photograph Investigation

Teacher Handout

Before the students begin this activity, have a brief classroom discussion about the photograph. Ask them what they notice right away. What do they think about the picture? When they are finished with the questions, ask them to discuss the details that they may have missed when they first saw the picture. Do they feel like they know more about the scene after the investigation?



1. Make a description list of everything you see (or don't see) using the boxes below:

PEOPLE

Examples:

8 people all together
5 girls—wearing long dresses or skirts
3 boys—wearing jackets and long pants
One girl is holding a fan
They all look young, probably teenagers

ACTIVITIES

Examples:

Someone has a bicycle
4 people sitting, talking or reading
4 people standing
One girl looks like she is pretending to spy on the couple sitting near her.
They are there to have fun/relax

SURROUNDINGS

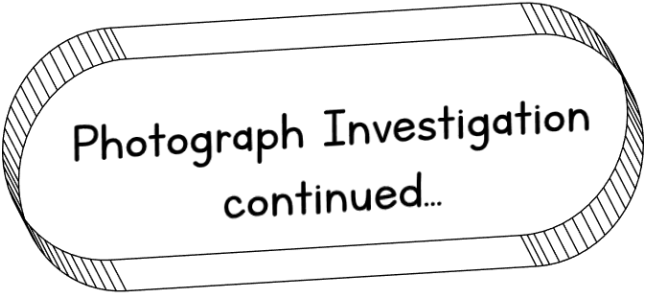
Examples:

Near a creek or river
Sitting in the grass and dirt
Nice weather, maybe warm because of hats and fan
They are near a bridge, maybe they used it to get to this spot.

OTHER

Examples:

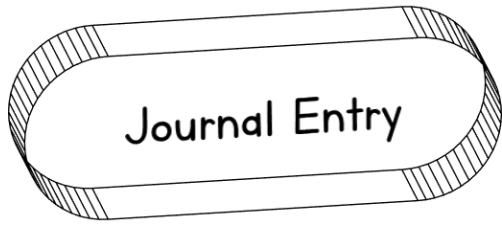
At least 3 hats pictured
They could be having a picnic, but we can't see food or a blanket.
Someone else is there taking the picture, maybe a parent or adult chaperone?



Photograph Investigation continued...

Teacher Handout

2. What extra information can be revealed by investigating the photograph?
 - a. What do you notice about the bridge? Can you tell its type or material? How strong does it look?
 - b. When was the picture taken? What time of day? What time of year? How can you tell?
 - c. Why do you think this picture was taken? Which clues help you know more about the people in it?
 - d. Describe the environment as if you were there. What would you hear? What would you smell?
 - e. What may have happened before this scene? What might happen after? Do you think the people used or will use the bridge?
3. What questions are you left with after investigating the photograph? Is there more you wish you knew?



Name _____

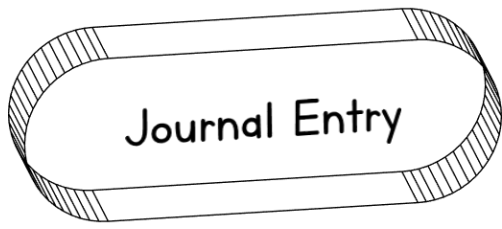
Old Alton Bridge

Imagine that you lived in Alton while it was still a busy town. After a long trip visiting family in another state, you walk across Old Alton Bridge to return home but find that all of the shops and businesses have closed and almost all of your neighbor's homes are empty. Write a journal entry describing your experience that day. Try to use as many of these vocabulary words from the reading as you can:

→ span, county seat, ford, restore, deck

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on the right side, suggesting it's resting on a surface. There is no handwriting or other markings on the paper.

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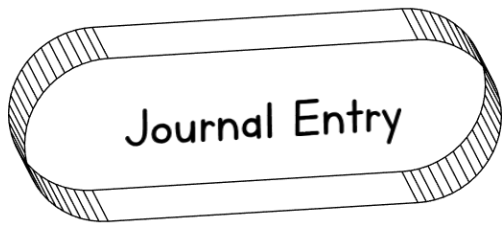
Name _____

Donald Road Bridge

Donald Road Bridge helped Denton County by connecting its farmers to the operators of cotton gins or wheat mills in Krum. If you lived in Denton County in 1903, would you rather work on a farm growing wheat or cotton or in Krum running a gin or a mill? Use the space below to write about one day working one of these jobs. How might the Donald Road Bridge affect your day? Try to use as many of these vocabulary words from the reading as you can:

→ isolated, mill, gin, demolition, native

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



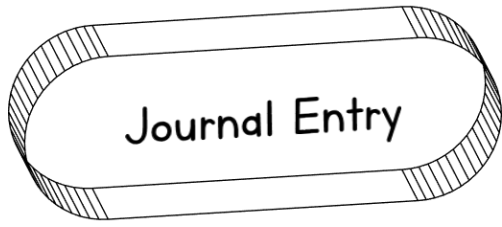
Name _____

Rector Road Bridge

Bridges can be expensive and Rector Road Bridge came at a high price for the citizens of Sanger in 1907. They donated \$1,200 of their own money for it, a price tag that would be worth over \$30,000 today! Imagine it is 1906 and you see the need for a new bridge in Sanger. To get it built, you must convince your neighbors to donate money. Persuade them in the space below using facts from the reading. Why do they need it? What value will it bring? Try to use as many of these vocabulary words from the reading as you can:

→ economy, prosperity, leisure, beneficial, environmentally sensitive area

This image shows a single page of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



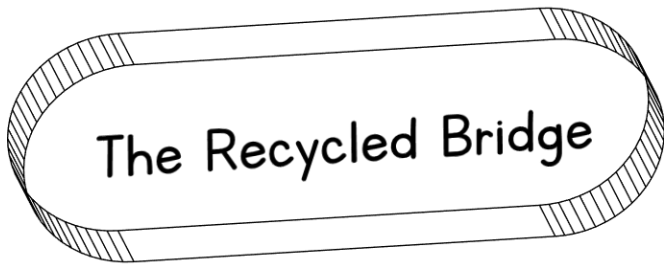
Name _____

Elm Fork Bridge

One of the first people to own a car in Denton County described driving the car in his neighborhood for the first time as “wolves sat on their haunches and stared in astonishment.” Imagine driving or riding in an automobile in Denton County in the early 1900s when few people had even seen a car and improved structures like the Elm Fork Bridge did not yet exist. What challenges would there be? How would others in the neighborhood react? Try to use as many of these vocabulary words from the reading as you can:

→ revolutionize, assembly line, accommodate, modernize, bypass

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.



The Recycled Bridge

Activity Guide

In this activity, students will work in teams to design and construct a bridge. Rather than using new supplies such as craft sticks or toothpicks, they will use recycled items or objects from around the classroom as their materials. Similar to the repurposing of historic bridges in Denton County, students will find new uses for old items, discovering the benefits and challenges of building without drawing on new materials or depleting natural resources.



Materials

Several days before the activity, ask students to start bringing in recycled materials from home. Encourage your students to be creative with their choices! To the right are some examples:

- Boxes- all sizes (shoebox, cereal box, etc...)
- Paper towel/gift wrap rolls
- Milk or egg cartons
- Plastic bottles/cups/plates
- Strings or old shoelaces

Gather items from around the classroom in one spot, or establish which items are permitted for use and allow students a set amount of time to gather materials. Explain how some items (markers, rulers, etc.) may need to be returned intact after the activity. To the right are examples:

- Markers/pens/pencils
- Rulers
- Pencil holder
- Rope/string
- Scrap paper (not new paper)

Tip!

Limit selections to a maximum number, or provide each team a bag or box they can fill.

Some non-recycled adhesive may be necessary. Challenge students by limiting the amount they can use, or awarding a prize to the team that uses the least. To the right are remaining materials needed:

- Tape/glue
- Tacks/brads/binder clips
- Rulers, paper, pencils for drawing designs
- Weights, coins, blocks, etc... to test bridge strength



Introduction

Tell students that today they will be thinking like a civil engineer—a person who uses math and science to design roads, bridges, and other structures for their community—by working in teams to build a bridge out of recycled materials.

Discuss what the earliest bridges may have looked like. Who built them? Why? Discuss how bridges have evolved. Use the guidebook or online pictures and videos to show different types (beam, truss, arch) and ask students to come up with pros and cons for each design. Which bridge is the strongest? Which is the most expensive to construct? Which is the safest? What are some aspects they all have in common?



Directions

1. Divide students into groups (3-5). Their first task will be to choose jobs for each group member. Some job ideas include but are not limited to:
 - Architect- in charge of drawing the agreed upon design for their group.
 - Scavenger- gathers materials based on ideas discussed by the group beforehand.
 - Assessor- tests the strength of the bridge throughout the building process.
 - Spokesperson- presents their group's design to the class, describing the planning and building process.
2. After assigning duties, tell students they have 10-15 minutes to finish the following tasks:
 - Decide which type of bridge they will construct.
 - Discuss the materials they will need the scavenger to collect.
 - Agree on a design and approve the architect's final sketch.

Tip!

Help groups manage their time with alarms or warnings. Be sure they are working on the final design at least five minutes before their time is up.

3. The scavengers will have a few minutes to gather material for their groups (either a fixed number of items or as much as they can fit in the container provided).
4. Begin construction! All group members should be involved in this step. The spokesperson can take notes of their group's experience to share with the class later. The assessor will perform strength and stability tests throughout the process. The duration of this step will depend on the disposition and size of each class; decide on a time frame that works for your students.
5. When the time is up, pass out evaluation sheets to each student, then one by one each group will present their bridge to the class. The spokesperson will relate their groups planning and building experience and the assessor will demonstrate the bridge strength by stacking items of uniform weight (coins, blocks, etc) on top. During presentations, the other students will evaluate the strength, aesthetic appeal, and quantity of non-recycled material for each other's designs, recording their scores on the evaluation sheet.



Evaluation Sheet



2018